# XB1085 Series

## 3.0A Positive Voltage Regulator

## ■GENERAL DESCRIPTION

The XB1085 is a series of low dropout positive voltage regulators with a high output current capacity of 3.0A .
Stable output can be maintained by using 10μF ($C_{IN}$) and 22μF ($C_L$) of tantalum capacitors.
The fixed voltage types (XB1085P series) are available in 1.5V, 1.8V, 2.5V, 3.3V, and 5.0V. The voltage adjustable type (XB1085K series) is also available which can set the output voltage with only two external resistors.
With an overcurrent and thermal protection circuit built-in, the IC is disabled for protection when an output current reaches limit current or junction temperature increases up to limit temperature.
The XB1085 series is available in TO-252 package.

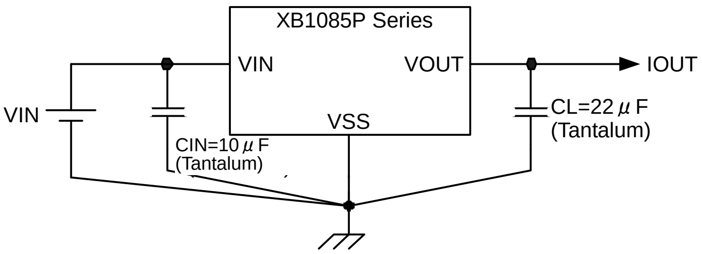
## ■APPLICATIONS

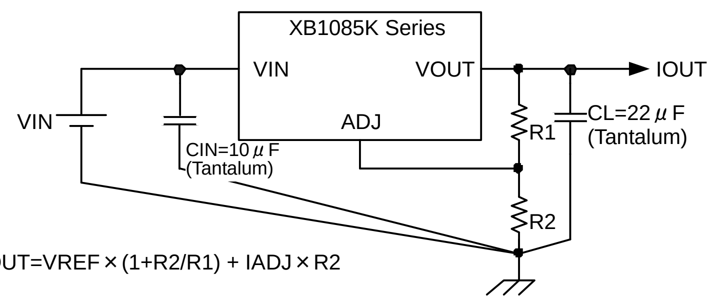
- High efficiency linear regulators
- Battery chargers
- DVD drives
- Set top boxes
- Various battery drive equipment

## ■FEATURES

**Maximum Output Current** : More than 3.0A (within Pd)
**Maximum Operating Voltage** : 12V
**Output Voltage** : 1.5V, 1.8V, 2.5V, 3.3V, 5.0V, (XB1085P)
Externally Set (XB1085K/ Reference Voltage 1.25V (TYP.))
**Output Voltage Accuracy** : ±1% ( Tj =25℃)
**Dropout Voltage** : 1.3V @ $I_{OUT}$=3.0A (TYP.)
**Line Regulation** : 0.015% (TYP.) <ADJ>
**Load Regulation** : 0.1% (TYP.) <ADJ>
**Reference Voltage Pin Current**: Less than 120μA <ADJ>
**Overcurrent Protection Circuit Built-In**
**Thermal Protection Circuit Built-In**
**Package** : TO-252
**Environmentally Friendly** : EU RoHS Compliant

## ■TYPICAL APPLICATION CIRCUITS

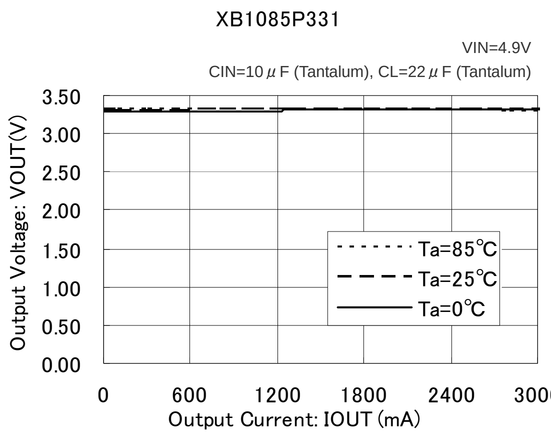


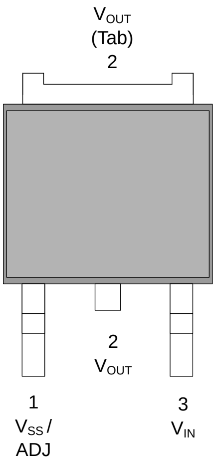

VOUT=VREF×(1+R2/R1) + IADJ×R2

## ■TYPICAL PERFORMANCE CHARACTERISTICS

●Output Voltage vs. Output Current



## ■PIN CONFIGURATION




TO-252
(TOP VIEW)

## ■PIN ASSIGNMENT

| PIN NUMBER | PIN NAME | FUNCITONS |
|---|---|---|
| TO-252 | | |
| 1 | $V_{SS}$ / ADJ | Ground / Reference Voltage |
| 2 | $V_{OUT}$ | Output |
| 3 | $V_{IN}$ | Input |

## ■PRODUCT CLASSIFICATION

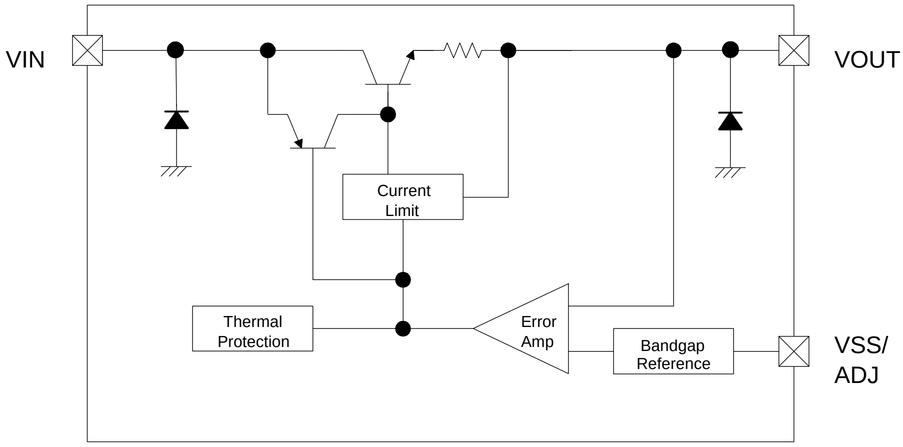
●Ordering Information

XB1085①②③④⑤⑥-⑦[*1]

| DESIGNATOR | DESCRIPTION | SYNBOL | DESCRIPTION |
|---|---|---|---|
| ① | Type of Regulators | P | Fixed $V_{OUT}$ |
| | | K | Adjustable (Externally Set) |
| ②③④ | Output Voltage and Output Voltage Accuracy | 151 | $V_{OUT}$=1.5V (±1%) |
| | | 181 | $V_{OUT}$=1.8V (±1%) |
| | | 251 | $V_{OUT}$=2.5V (±1%) |
| | | 331 | $V_{OUT}$=3.3V (±1%) |
| | | 501 | $V_{OUT}$=5.0V (±1%) |
| | | 12B | $V_{REF}$=1.25V (±1%) |
| ⑤⑥-⑦ | Package (Oder Unit) | JR | TO-252 (2,500/Reel) |
| | | JR-G | TO-252 (2,500/Reel) |

[*1] The “-G” suffix indicates that the products are Halogen and Antimony free as well as being fully RoHS compliant.

## ■BLOCK DIAGRAM




*Diodes inside the circuit are ESD protection diodes.

## ■ABSOLUTE MAXIMUM RATINGS

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---|---|---|---|---|
| Input Voltage | | $V_{IN}$ | 18 | V |
| Power Dissipation | TO-252 | Pd | 1300 (*2) | mW |
| Operating Junction Temperature | | Tj | 125 | ℃ |
| Storage Temperature Range | | Tstg | - 55 ~ 125 | ℃ |

Note:

*1: Stresses greater than those listed above ratings may cause permanent damage to the device.

*2: The rating of the power dissipation is determined when mounted on the PCB.

## ■ELECTRICAL CHARACTERISTICS

XB1085PxxxJ

Tj= 25℃ unless otherwise specified

| PARAMETER | SYMBOL | CONDITIONS | | MIN. | TYP. | MAX. | UNIT | CIRCUIT |
|---|---|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ | $V_{IN}$=4.5V, $I_{OUT}$=0mA | | 1.485 | 1.5 | 1.515 | V | ① |
| | (1.5V) | | O.T.(*1) | 1.47 | | 1.53 | | |
| | $V_{OUT}$ | $V_{IN}$=4.8V, $I_{OUT}$=0mA | | 1.782 | 1.8 | 1.818 | V | ① |
| | (1.8V) | | O.T.(*1) | 1.764 | | 1.836 | | |
| | $V_{OUT}$ | $V_{IN}$=5.5V, $I_{OUT}$=0mA | | 2.475 | 2.5 | 2.525 | V | ① |
| | (2.5V) | | O.T.(*1) | 2.450 | - | 2.550 | | |
| | $V_{OUT}$ | $V_{IN}$=6.3V, $I_{OUT}$=0mA | | 3.267 | 3.3 | 3.333 | V | ① |
| | (3.3V) | | O.T.(*1) | 3.234 | - | 3.366 | | |
| | $V_{OUT}$ | $V_{IN}$=8.0V, $I_{OUT}$=0mA | | 4.95 | 5 | 5.05 | V | ① |
| | (5.0V) | | O.T.(*1) | 4.9 | | 5.1 | | |
| Line Regulation | ⊿$V_{OUT1}$ | 3V≦$V_{IN}$≦10V | | - | 0.5 | 6 | mV | ① |
| | (1.5V) | $I_{OUT}$=10mA | O.T.(*1) | | 1 | 6 | | |
| | ⊿$V_{OUT1}$ | 3.3V≦$V_{IN}$≦10V | | - | 0.5 | 6 | mV | ① |
| | (1.8V) | $I_{OUT}$=10mA | O.T.(*1) | | 1 | 6 | | |
| | ⊿$V_{OUT1}$ | 4V≦$V_{IN}$≦10V | | - | 0.5 | 6 | mV | ① |
| | (2.5V) | $I_{OUT}$=10mA | O.T.(*1) | | 1 | 6 | | |
| | ⊿$V_{OUT1}$ | 4.8V≦$V_{IN}$≦10V | | - | 0.5 | 6 | mV | ① |
| | (3.3V) | $I_{OUT}$=10mA | O.T.(*1) | | 1 | 6 | | |
| | ⊿$V_{OUT1}$ | 6.5V≦$V_{IN}$≦10V | | - | 0.5 | 10 | mV | ① |
| | (5.0V) | $I_{OUT}$=10mA | O.T.(*1) | | 1 | 10 | | |
| Load Regulation | ⊿$V_{OUT2}$ | $V_{IN}$-$V_{OUT}$=3.0V | | - | 3 | 15 | mV | ① |
| | (1.5V) | 0mA≦$I_{OUT}$≦3.0A | O.T.(*1) | | 7 | 20 | | |
| | ⊿$V_{OUT2}$ | $V_{IN}$-$V_{OUT}$=3.0V | | - | 3 | 15 | mV | ① |
| | (1.8V) | 0mA≦$I_{OUT}$≦3.0A | O.T.(*1) | | 7 | 20 | | |
| | ⊿$V_{OUT2}$ | $V_{IN}$-$V_{OUT}$=3.0V | | - | 3 | 15 | mV | ① |
| | (2.5V) | 0mA≦$I_{OUT}$≦3.0A | O.T.(*1) | | 7 | 20 | | |
| | ⊿$V_{OUT2}$ | $V_{IN}$-$V_{OUT}$=3.0V | | - | 3 | 15 | mV | ① |
| | (3.3V) | 0mA≦$I_{OUT}$≦3.0A | O.T.(*1) | | 7 | 20 | | |
| | ⊿$V_{OUT2}$ | $V_{IN}$-$V_{OUT}$=3.0V | | - | 5 | 20 | mV | ① |
| | (5.0V) | 0mA≦$I_{OUT}$≦3.0A | O.T.(*1) | | 10 | 35 | | |
| Dropout Voltage | Vdif | ⊿$V_{OUT}$=1%, $I_{OUT}$=3.0A | | - | 1.3 | 1.5 | V | ① |
| Limit Current | $I_{LIM}$ | $V_{IN}$-$V_{OUT}$=3.0V | | 3.2 | 4.5 | - | A | ① |
| Supply Current | $I_{DD}$ | $V_{IN}$=10V | O.T.(*1) | - | 5 | 10 | mA | ② |
| Temperature Stability | Ts | $V_{IN}$-$V_{OUT}$=1.5V<br>$I_{OUT}$=10mA | O.T.(*1) | - | 0.5 | - | % | - |

Note:

*1: O.T. denotes the specifications which apply over the operating junction Temperature range (0℃ ≦ Tj ≦125°C).

Please be sure that the power consumption does not exceed the power dissipation rating 1300mW. If the power consumption exceeds the power dissipation rating and the operating junction temperature rises more than the rating 125°C, the IC enters thermal shutdown state.

## ■ELECTRICAL CHARACTERISTICS (Continued)

XB1085K12BJ

Tj= 25℃ unless otherwise specified

| PARAMETER | SYMBOL | CONDITIONS | | MIN. | TYP. | MAX. | UNIT | CIRCUIT |
|---|---|---|---|---|---|---|---|---|
| Reference Voltage | $V_{REF}$ | $V_{IN}$-$V_{OUT}$=3.0V | | 1.238 | 1.25 | 1.262 | V | ① |
| | | $I_{OUT}$=10mA | O.T.(*1) | 1.225 | - | 1.275 | | |
| Line Regulation | ⊿$V_{OUT1}$ | 2.85V≦$V_{IN}$≦10V | | - | 0.015 | 0.2 | % | ① |
| | | $I_{OUT}$=10mA | O.T.(*1) | | 0.035 | 0.2 | | |
| Load Regulation | ⊿$V_{OUT2}$ | $V_{IN}$-$V_{OUT}$=3.0V | | - | 0.1 | 0.3 | % | ① |
| | | 0mA≦$I_{OUT}$≦3.0A | O.T.(*1) | | 0.2 | 0.4 | | |
| Dropout Voltage | Vdif | ⊿$V_{OUT}$=1%, $I_{OUT}$=3.0A | | - | 1.3 | 1.5 | V | ① |
| Limit Current | $I_{LIM}$ | $V_{IN}$-$V_{OUT}$=3.0V | | 3.2 | 4.5 | - | A | ① |
| Temperature Stability | Ts | $V_{IN}$-$V_{OUT}$=1.5V<br>$I_{OUT}$=10mA | O.T.(*1) | - | 0.5 | - | % | - |
| Minimum Output Current | $I_{OUTmin}$ | $V_{IN}$=10V | O.T.(*1) | - | 3 | 10 | mA | ① |
| Adjust Voltage Pin Current | $I_{ADJ}$ | $V_{IN}$=4.25V, $I_{OUT}$=10mA | O.T.(*1) | - | 55 | 120 | μA | ① |

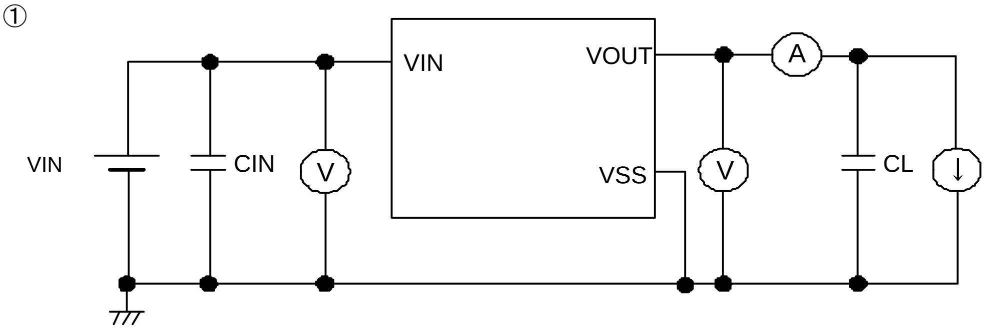
Note:

*1: O.T. denotes the specifications which apply over the operating junction Temperature range (0℃ ≦ Tj ≦125°C).
Please be sure that the power consumption does not exceed the power dissipation rating, 1300mW. If the power consumption exceeds the power dissipation rating and the operating junction temperature rises more than the rating, 125°C, the IC enters thermal shutdown state.

## ■TEST CIRCUITS

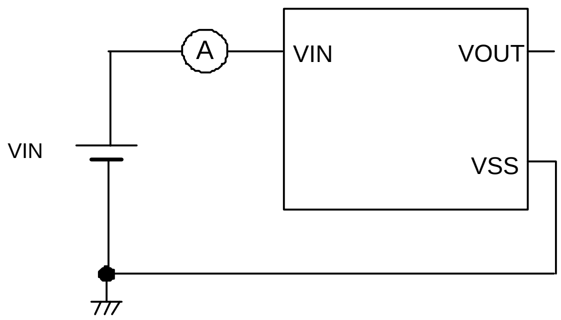
●XB1085PxxxJ

Circuit ①



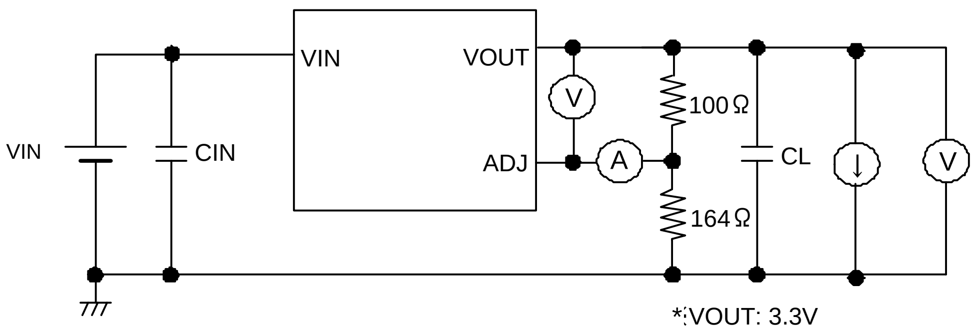

* CIN=10μF (Tantalum), CL=22μF (Tantalum)

Circuit ②




●XB1085K12BJ

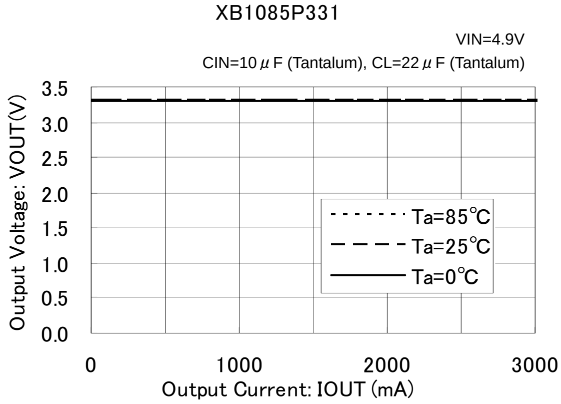
Circuit ①



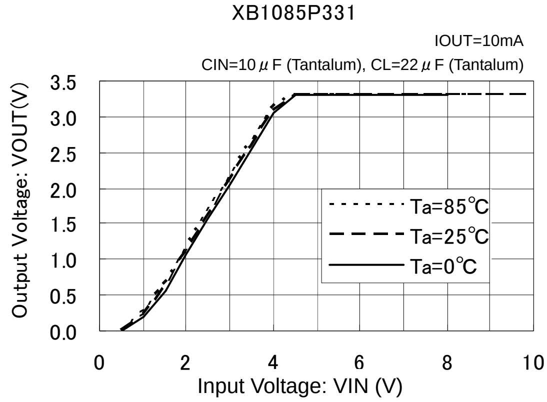

* CIN=10μF (Tantalum), CL=22μF (Tantalum)

## ■TYPICAL PERFORMANCE CHARACTERISTICS

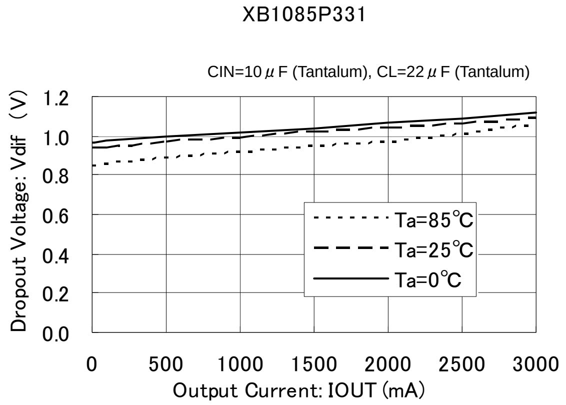
(1) Output Voltage vs. Output Current



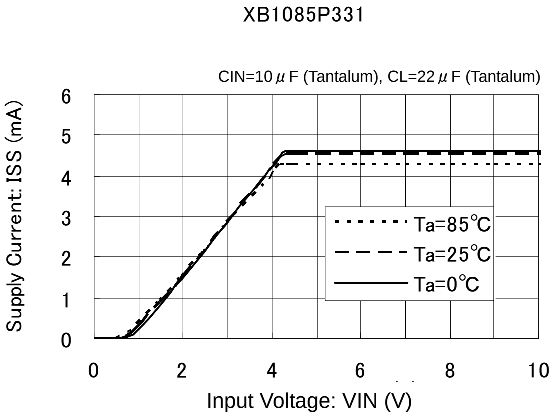

(2) Output Voltage vs. Input Voltage



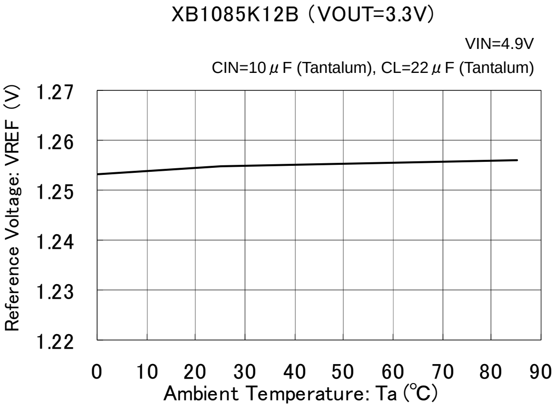

(3) Dropout Voltage vs. Output Current



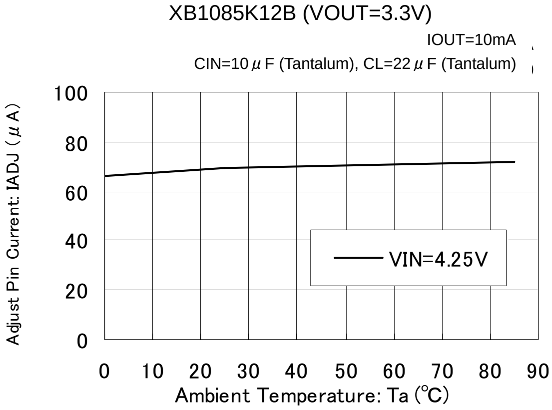

(4) Supply Current vs. Input Voltage




(5) Reference Voltage vs. Ambient Temperature



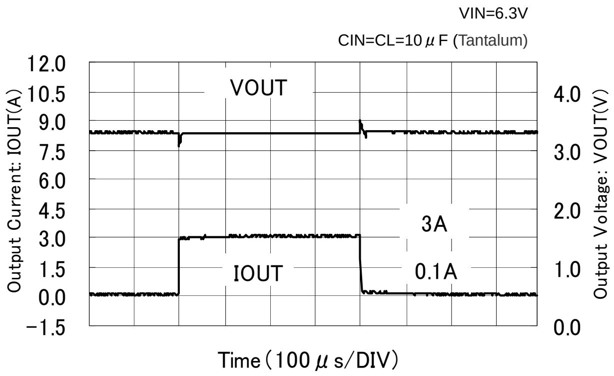

(6) Adjust Pin Current vs. Ambient Temperature



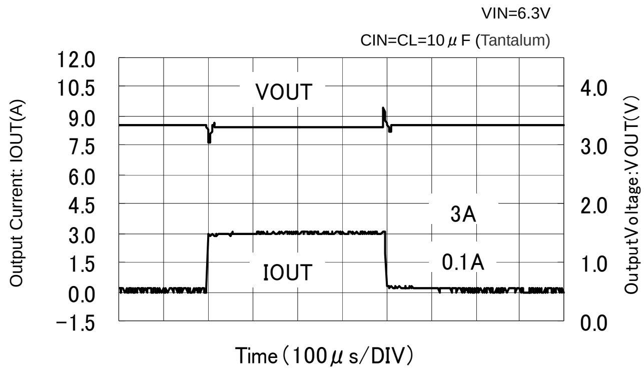
## ■TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

(7) Load Transient Response

XB1085P331

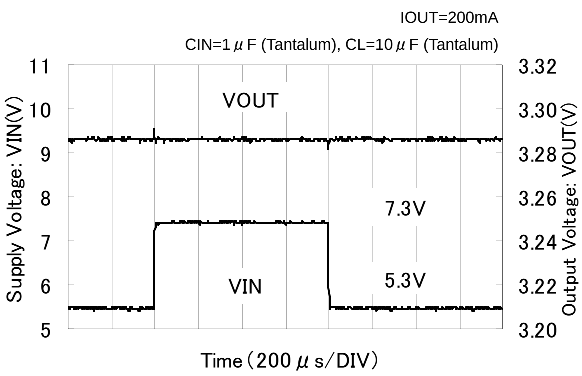



XB1085K12B(VOUT=3.3V)

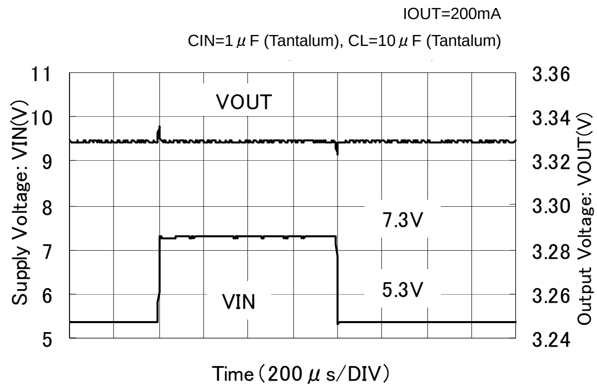



(8) Input Transient Response

XB1085P331

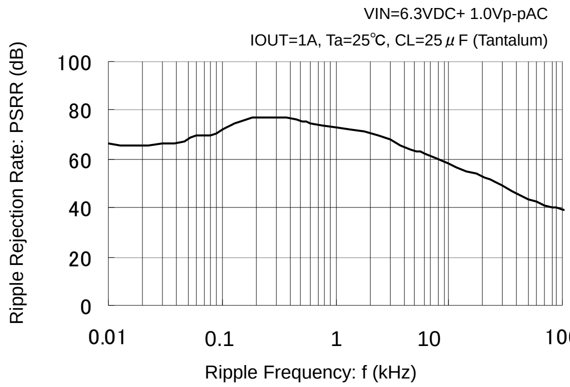



XB1085K12B(VOUT=3.3V)

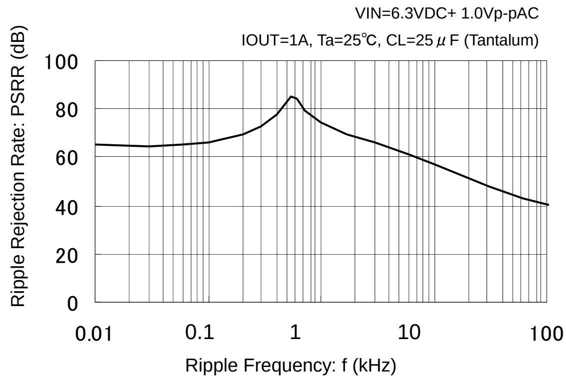



(9) Ripple Rejection Rate

XB1085P331

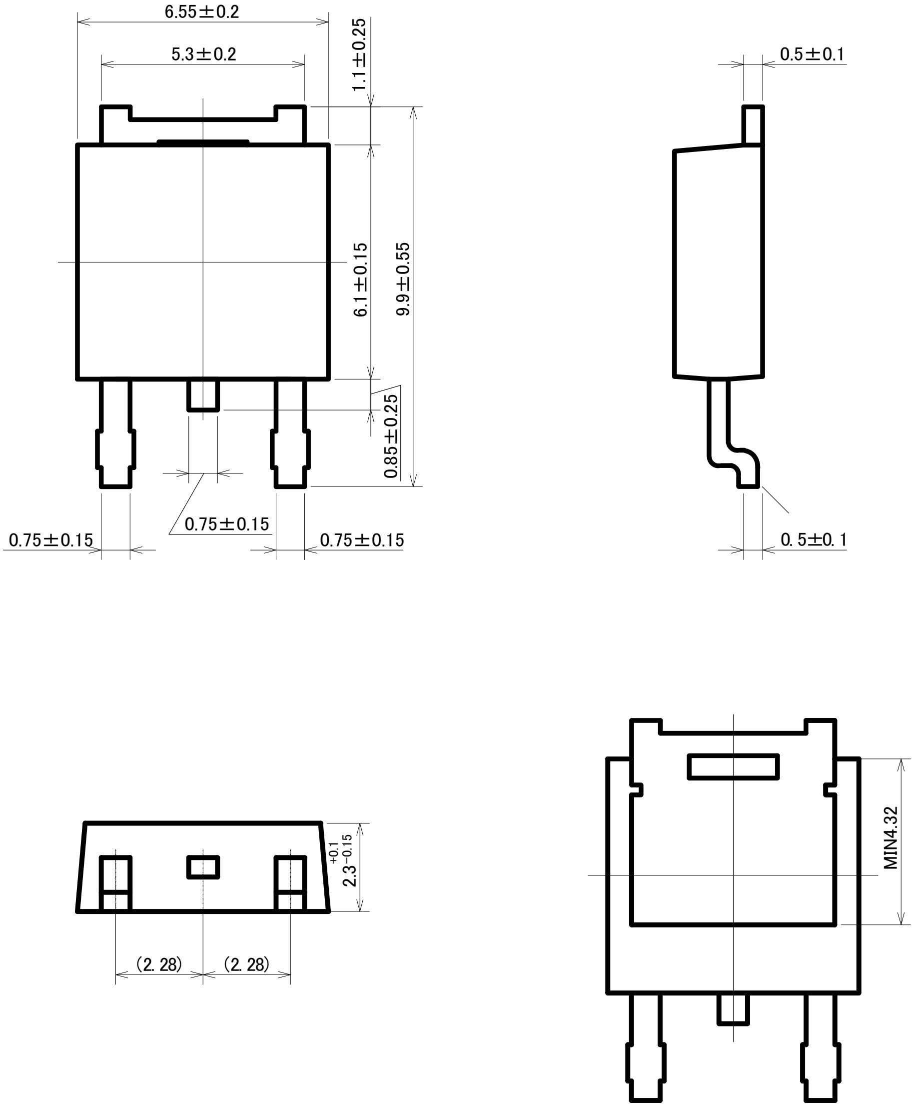



XB1085K12B(VOUT=3.3V)



# ■ PACKAGING INFORMATION

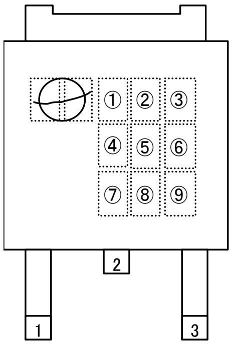
●TO-252




UNIT: mm

## ■MARKING RULE

●TO-252




TO-252
(TOP VIEW)

①② represents product series

| MARK | | PRODUCT SERIES |
|---|---|---|
| ① | ② | |
| 8 | 5 | XB1085****J* |

③ represent the type of regulator

| MARK | TYPE | PRODUCT SERIES |
|---|---|---|
| P | Fixed Output Type | XB1085P***J* |
| K | Adjustable (Externally Set) | XB1085K***J* |

④⑤ represents output voltage

| MARK | | OUTPUT VOTLAGE | PRODUCT SERIES |
|---|---|---|---|
| ④ | ⑤ | | |
| 1 | 5 | 1.5V | XB1085P151J* |
| 1 | 8 | 1.8V | XB1085P181J* |
| 2 | 5 | 2.5V | XB1085P251J* |
| 3 | 3 | 3.3V | XB1085P331J* |
| 5 | 0 | 5.0V | XB1085P501J* |
| 1 | 2 | ADJ | XB1082K12BJ* |

⑥ represents output voltage accuracy and output type

| MARK | OUTPUT VOLTAGE ACCURACY (OUTPUT TYPE) | PRODUCT SERIES |
|---|---|---|
| 1 | 1% | XB1085P**1J* |
| B | Adjustable | XB1085K12BJ* |

⑦ represents the last digit of production year
ex.)

| MARK | PRODUCTION YEAR |
|---|---|
| 7 | 2007 |
| 8 | 2008 |

⑧⑨ represents production lot number
0 to 9, A to Z repeated.
(G, I, J, O, Q, W excepted. ‘0’ of the first digit does not mark.)
* No character inversion used.
ex.)

| MARK | | PRODUCTION LOT NUMBER |
|---|---|---|
| ⑧ | ⑨ | |
| Blank | 3 | 03 |
| 1 | A | 1A |

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